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| 10/501,547 | 07/16/2004 | Douglas Beverley Stevenson King | 540-512 | 6374 |

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| EXAMINER | |
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| IGYARTO, CAROLYN | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/501,547 | KING, DOUGLAS BEVERLEY STEVENSON | |
| | Examiner | Art Unit | |
| | Carolyn Igyarto | 2884 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *16 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21 and 23-27* is/are rejected.

7)☒ Claim(s) *22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/16/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### Preliminary Amendments

2. Receipt is acknowledged of the preliminary amendments, received July 16, 2004.

### *Information Disclosure Statement*

3. The information disclosure statement submitted on May 10, 2005 has been considered by the Examiner and made of record in the application file.

### *Specification*

4. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

#### Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. **Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading.** If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

5. Currently the specification does not include section headings. The Examiner suggests including section headings to improve the clarity of the application.

***Claim Objections***

6. Claims 1-3, 7, 10-13, 15, 18-19, and 22-27 are objected to because of the following informalities:

7. Claim 1: Line 1 recites "the combination"; instead "a combination" should be recited. Line 5 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

8. Claim 2: Line 1 recites "the capture material"; instead "the neutron capture material" should be recited. Line 2 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

9. Claim 3: Line 1 recites "the capture material"; instead "the neutron capture material" should be recited. Line 2 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

10. Claim 7: Line 2 recites "the capture material"; instead "the neutron capture material" should be recited. Lines 2-3 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

11. Claim 10, line 1 recites "the filter element"; instead "the radiation filter element" should be recited.

12. Claim 11, line 2 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

13. Claim 12: Line 2 recites "the capture material"; instead "the neutron capture material" should be recited. Lines 3-4 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

14. Claim 13, line 1 recites "the capture material"; instead "the neutron capture material" should be recited.

15. Claim 15, line 1 recites "the capture material"; instead "the neutron capture material" should be recited.

16. Claim 18. Line 3 recites "the capture material"; instead "the neutron capture material" should be recited. Line 5 recites "the layer"; instead "the filter layer" should be recited.

17. Claim 19, lines 2-3 recites "the capture material"; instead "the neutron capture material" should be recited.

18. Claim 22, line 6 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

19. Claim 23, line 5 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

20. Claim 24, line 3 recites "the capture material"; instead "the neutron capture material" should be recited.

21. Claim 25: Line 2 recites "the capture material"; instead "the neutron capture material" should be recited. Line 3 recites "the sensing element or elements"; instead "the at least one sensing element" should be recited.

22. Claim 26, line 1 recites "the capture material"; instead "the neutron capture material" should be recited.

23. Claim 27, line 1 recites "the capture material"; instead "the neutron capture material" should be recited.

24. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

25. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

26. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

27. Claim 11 recites the limitation "the said second kind" in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

28. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent

> granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

29. Claims 1-4, 6-8, 12-16, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Seidel et al. (US 5,940,460), hereinafter referred to as Seidel.

30. With respect to claim 1, Seidel teaches a neutron detector comprising the combination of a solid state device (Abstract) including at least one sensing element (col. 2, lines 39-40) having an electrical characteristic which changes in the presence of charged particles or electromagnetic radiation (col. 3, line 15 and 45-47), and a neutron capture material (col. 3, lines 15) which is associated with the solid state device and which has the property that it emits particles or radiation to which the sensing element or elements of the solid state device are responsive when free neutrons are incident upon it (col. 5, lines 1-3) such that the solid state device provides an electrical output indicative of incident free neutrons (col. 4, lines 50-52).

31. With respect to claim 1, Seidel teaches the capture material is incorporated in a capture layer overlying the sensing element or elements of the solid state device (col. 5, lines 19-20).

32. With respect to claim 3, Seidel teaches the capture material is in contact with the sensing element or elements (col. 5, lines 19-20).

33. With respect to claim 4, Seidel teaches the solid state device has a plurality of sensing elements arranged in a distributed array (Fig. 1).

34. With respect to claim 6, Seidel teaches the solid state device is an active pixel sensor (APS) (col. 3, lines 14-15).

35. With respect to claim 7, Seidel teaches the capture material is a doping material incorporated in the sensing element or elements of the solid state device (col. 5, lines 3-5).

36. With respect to claim 8, Seidel teaches the concentration of the capture material per unit length or unit area varies across the array of sensing elements to yield a sensitivity variation between different parts of the array (col. 4, lines 43-46).

37. With respect to claim 12, Seidel teaches the capture material has the property that free neutron radiation incident upon it causes it to emit charged particles and the sensing element or elements are responsive to the emitted charged particles (col. 5, lines 1-3; col. 3, lines 45-47).

38. With respect to claim 13, Seidel teaches the capture material includes boron-10 (col. 5, lines 5-9).

39. With respect to claim 14, Seidel teaches a capture element in the form of a layer of a boron-10 enriched borate (col. 5, lines 14-15).

40. With respect to claim 15, Seidel teaches the capture material includes helium-3 (col. 5, lines 5-9).

41. With respect to claim 16, Seidel teaches a capture element in the form of a layer of a solid matrix containing bubbles of helium-3 gas (col. 5, line 9).

42. With respect to claim 21, Seidel teaches a means for integrating an output of the solid state device over time to produce a radiation dose reading (col. 8, lines 24-26).

43. Claims 1, 4-5, 9, 12, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Carron et al. (US 5,399,863), hereinafter referred to as Carron.

44. With respect to claim 1, Carron teaches a neutron detector comprising the combination of a solid state device (Abstract) including at least one sensing element having an electrical characteristic which changes in the presence of charged particles or electromagnetic radiation (CCD array col. 2, line 54), and a neutron capture material which is associated with the solid state device and which has the property that it emits particles or radiation to which the sensing element or elements of the solid state device are responsive when free neutrons are incident upon it (boron slab col. 2, line 53; col. 1, lines 29-32) such that the solid state device provides an electrical output indicative of incident free neutrons (Fig. 2).

45. With respect to claim 4, Carron teaches the solid state device has a plurality of sensing elements arranged in a distributed array (CCD array col. 2, line 54).

46. With respect to claim 5, Carron teaches the solid state device is a charge coupled device (CCD) (CCD array col. 2, line 54).

47. With respect to claim 9, Carron teaches a radiation filter element overlying the said combination, the radiation filter comprising radiation filtering material (col. 5, lines 54-56).

48. With respect to claim 12, Carron teaches the capture material has the property that free neutron radiation incident upon it causes it to emit charged particles and the sensing element or elements are responsive to the emitted charged particles (col. 1, lines 29-32).

49. With respect to claim 17, Carron teaches is sensitive to incident free neutrons with energies in the region of 0.025eV (thermal neutrons Abstract) but substantially

insensitive to incident free neutrons with energies above 0.5eV (reduced sensitivity to fast neutrons; col. 3, line 45).

50. Claims 1, 11, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Decossas et al. (US 5,083,028), hereinafter referred to as Decossas.

51. With respect to claim 1, Decossas teaches a neutron detector comprising the combination of a solid state device including at least one sensing element having an electrical characteristic which changes in the presence of charged particles or electromagnetic radiation (diode with active surface col. 4, lines 18), and a neutron capture material which is associated with the solid state device and which has the property that it emits particles or radiation to which the sensing element or elements of the solid state device are responsive when free neutrons are incident upon it such that the solid state device provides an electrical output indicative of incident free neutrons (col. 4, lines19-20).

52. Claim 11 has been rejected under 35 USC 112. For purposes of a prior art search the Examiner is interpreting the second kind of radiation to be neutrons that are incident on the neutron capture material.

53. With respect to claim 11, Decossas teaches a shield positioned over the sensing element or elements so as substantially to exclude radiation of a kind other than the said second kind (screen; col. 3, lines 60-67).

54. With respect to claim 20, Decossas teaches a discriminator coupled to an output of the solid state device, the discriminator selecting only electrical signals received from

the output with an amplitude greater than a predetermined value (col. 4, lines 64 through col. 5, line 1).

55. Claims 1, 12, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitaguchi et al. (US Re35,908), hereinafter referred to as Kitaguchi.

56. With respect to claim 1, Kitaguchi teaches a neutron detector comprising the combination of a solid state device including at (Abstract) least one sensing element having an electrical characteristic which changes in the presence of charged particles or electromagnetic radiation (col. 9, lines 25-26), and a neutron capture material which is associated with the solid state device and which has the property that it emits particles or radiation to which the sensing element or elements of the solid state device are responsive when free neutrons are incident upon it (col. 9, lines 20-23) such that the solid state device provides an electrical output indicative of incident free neutrons (col. 9, lines 27-31).

57. With respect to claim 12, Kitaguchi teaches the capture material has the property that free neutron radiation incident upon it causes it to emit charged particles and the sensing element or elements are responsive to the emitted charged particles (col. 9, lines 20-31).

58. With respect to claim 19, Kitaguchi teaches a neutron moderator layer over the solid state device and the capture material, the moderator layer being formed of a material which reduces the energy of free neutrons passing through the layer, whereby the detector is sensitive to incident free neutrons with energies higher than 0.5eV (2 moderator Fig. 11; col. 7, lines 29-33).

59. Claims 1 and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (US 2002/0171042), hereinafter referred to as Chen.

60. With respect to claim 1, Chen teaches a neutron detector ([0070], line 2) comprising the combination of a solid state device including at least one sensing element having an electrical characteristic which changes in the presence of charged particles or electromagnetic radiation ([0070], line 3), and a neutron capture material which is associated with the solid state device and which has the property that it emits particles or radiation to which the sensing element or elements of the solid state device are responsive when free neutrons are incident upon it ([0070], line 3) such that the solid state device provides an electrical output indicative of incident free neutrons ([0071], lines 3-4).

61. With respect to claim 25, Chen teaches the capture material has the property that x-rays incident upon it to cause it to emit radiation to which the sensing element or elements are sensitive ([0070], lines 12-14; inherently ZnS(Ag) has the property of being sensitive to x-rays, because ZnS(Ag) is conventionally used to detect x-rays (See Katagiri, Masaki (US 6,812,469) col. 12, lines 31-32)).

62. With respect to claim 26, Chen teaches the capture material has the property of emitting photons when x-rays are incident upon it (scintillator [0070], line 3).

63. With respect top claim 27, Chen teaches the capture material includes zinc sulphide ([0070], lines12-14).

***Claim Rejections - 35 USC § 103***

64. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

65. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carron et al. (US 5,399,863), hereinafter referred to as Carron, as applied to claims 1, 9, and 12 above, and further in view of Moscovitch et al (US 5,572,028), hereinafter referred to as Moscovitch.

66. With respect to claim 10, Carron teaches all of the limitations of claims 1 and 9, as described above.

67. Carron does not teach the filter element is constructed as a filter layer in which the amount of the radiation filtering material per unit length or unit area varies across the layer.

68. Moscovitch teaches the filter element is constructed as a filter layer in which the amount of the radiation filtering material per unit length or unit area varies across the layer for the benefit of allowing measurements made of different energy ranges in order to better estimate the risks associated with the incident radiation having different energy values (col. 3, lines 34-38).

69. It would have been obvious to one of ordinary skill at the time the invention was made to include the filter element is constructed as a filter layer in which the amount of the radiation filtering material per unit length or unit area varies across the layer for the

benefit of allowing measurements made of different energy ranges in order to better estimate the risks associated with the incident radiation having different energy values (col. 3, lines 34-38).

70. With respect to claim 18, Carron teaches all of the limitations of claims 1 and 12, as described above. Carron further teaches the solid state device has a distributed array of sensing cells (CCD array; col. 2, line 54) and, overlying the sensing cells and the capture material (boron slab; col. 2, line 53), a filter layer made of a neutron energy discriminating material selected to admit through the filter layer only neutrons having various energies (col. 5, lines 54-56).

71. Carron does not teach the thickness of the layer varying across the array of sensing cells to yield an energy spectrum sensitive profile for the detector.

72. Moscovitch teaches the thickness of the layer varying across the array of sensing cells to yield an energy spectrum sensitive profile for the detector for the benefit of allowing measurements made of different energy ranges in order to better estimate the risks associated with the incident radiation having different energy values (col. 3, lines 34-38).

73. It would have been obvious to one of ordinary skill at the time the invention to have the thickness of the layer varying across the array of sensing cells to yield an energy spectrum sensitive profile for the detector for the benefit of allowing measurements made of different energy ranges in order to better estimate the risks associated with the incident radiation having different energy values (col. 3, lines 34-38).

74. Claim 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carron et al. (US 5,399,863), hereinafter referred to as Carron, as applied to claim 1 above, and further in view of Fouilloy, Jean-Pierre (US 5,212,384), hereinafter referred to as Fouilloy.

75. With respect to claim 23, Carron teaches all of the limitations of claim 1, as explained above. Carron further teaches a layered shielding material, this being equivalent to a filter (col. 5, lines 54-56).

76. Carron does not teach a plurality of different filter elements and a filter carrier member carrying the filter elements, wherein the filter carrier member and the solid state device are movable relative to each other such that different filter elements may be brought into juxtaposition with the sensing element or elements of the solid device for the purpose of selecting different filter characteristics.

77. Fouilloy teaches a plurality of different filter elements and a filter carrier member carrying the filter elements, wherein the filter carrier member and the solid state device are movable relative to each other such that different filter elements may be brought into juxtaposition with the sensing element or elements of the solid device for the purpose of selecting different filter characteristics (Figs. 1-2; col. 3, lines 11-16) for the benefit of using one detector to detect different parts of the spectrum allowing measurements to be more easily acquired (col. 1, lines 37-50).

78. It would have been obvious to one of ordinary skill at the time the invention was made to use a plurality of different filter elements and a filter carrier member carrying the filter elements, wherein the filter carrier member and the solid state device are

movable relative to each other such that different filter elements may be brought into juxtaposition with the sensing element or elements of the solid device for the purpose of selecting different filter characteristics for the benefit of using one detector to detect different parts of the spectrum allowing measurements to be more easily acquired (col. 1, lines 37-50).

79. With respect to claim 24, Carron teaches all of limitations of claim 1 as described above. Carron further teaches a layered shielding material (col. 5, lines 54-56).

80. Carron does not teach a plurality of different shield members having different shielding characteristic which are selectively locatable to shield the capture material thereby substantially to exclude different kinds of unwanted radiation according to which shield member is selected.

81. Fouilloy teaches a plurality of different shield members having different shielding characteristic which are selectively locatable to shield the capture material thereby substantially to exclude different kinds of unwanted radiation according to which shield member is selected (Figs. 1-2; col. 3, lines 11-16) for the benefit of using one detector to detect different parts of the spectrum allowing measurements to be more easily acquired (col. 1, lines 37-50).

82. It would have been obvious to one of ordinary skill at the time the invention was made to use a plurality of different shield members having different shielding characteristic which are selectively locatable to shield the capture material thereby substantially to exclude different kinds of unwanted radiation according to which shield

member is selected for the benefit of using one detector to detect different parts of the spectrum allowing measurements to be more easily acquired (col. 1, lines 37-50).

***Allowable Subject Matter***

83. Claim 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

84. The following is a statement of reasons for the indication of allowable subject matter: Seidel et al. (US 5,940,460) teaches all of the limitations of claim 1. Seidel et al. does not teach a plurality of different capture elements including a capture material or materials, and a capture element carrier member carrying the capture elements, wherein the carrier member and the solid state device are positioned with respect to each other and moveable relative to each other such that different capture elements may be brought into juxtaposition with the sensing element or elements of the solid state device for the purpose of selecting different detector characteristics.

85. At least these further limitations are not taught or rendered obvious by the prior art.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carolyn Igyarto whose telephone number is (571) 270-1286. The examiner can normally be reached on Monday - Thursday, 7:30 A.M. to 5 P.M. E.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CI

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